1 /* Math/CS 466/666 Midterm Solutions

   Problem 1(i). Write or modify a computer program to implement Newton's method
   and use it to approximate the solution to $x^3 = \cos x$ starting with an initial guess of
   $x_0 = 1$. Print the first 5 iterations of the method. */

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7
8  #include <stdio.h>
9  #include <math.h>
10
11 double f(double x){
12     return x*x*x-cos(x);
13 }
14 double df(double x){
15     // Always set this to f'(x) where f(x) is defined above.
16     return 3*x*x+sin(x);
17 }
18
19 int main(){
20     printf(
21         "Math/CS 466/666 Midterm\nProblem 1(i).\n\n"
22         "%3s %24s\n","n","xn");
23     double x=1;
24     for(int i=0;;i++){
25         printf("%3d %24.14e\n",i,x);
26         if(i>=5) break;
27         x=x-f(x)/df(x);                    // x_{i+1} = x_i - f(x_i)/f'(x_i)
28     }
29 }
```